Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
B 14272.3 CS		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FR2004/050331	15.07.2004	17.07.2003

International Patent Classification (IPC) or national classification and IPC

H01F7/08

Applicant

COMMISSARIAT A L'ENERGIE ATOMIQUE

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☐ *(sent to the applicant and to the International Bureau)* a total of _____ sheets, as follows:

      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))

      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FR2004/050331

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (Rule 12.3 and 23.1(b))

☐ publication of the international application (Rule 12.4)

☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1-32 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

nos. 1-28 as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19

nos.* _____ received by this Authority on _____

nos.* _____ received by this Authority on _____

☒ the drawings:

sheets 1/12-12/12 as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FR2004/050331

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-28	YES
	Claims		NO
Inventive step (IS)	Claims	1-28	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-28	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

1. In the present report, reference is made to the following documents:

D1: PATENT ABSTRACTS OF JAPAN vol. 1998, no. 01, 30 January 1998 (1998-01-30) & JP 09 252570 A (TOSHIBA CORP), 22 September 1997 (1997-09-22);

D2: FR 2 828 000 A (COMMISSARIAT ENERGIE ATOMIQUE) 31 January 2003 (2003-01-31).

2. INDEPENDENT CLAIMS 1 and 21

2.1 Document D2, which is considered to be the most relevant prior art, describes (claims 1 and 25):

- A magnetic actuator as per the preamble in the present claim 1.

- "A production method for a magnetic actuator, comprising the following steps:
  - *forming, on a first substrate, housings for receiving magnets for a stationary magnetic*

portion and a mobile magnetic portion;

- *depositing the magnets in said housings;*
- *depositing a dielectric layer and etching same so as to expose the mobile magnetic portion magnet and its surroundings up to said stationary magnetic portion;*
- *forming, on a second substrate, at least one housing for receiving a conductor intended to initiate movement of said mobile magnetic portion;*
- *depositing the conductor in said housing;*
- *assembling the two substrates so that they are mutually facing; and*
- *totally or partially removing said first substrate in such a way as to release the mobile magnetic portion magnet."*

The subject matter of independent claim 21 differs from the above in that:

The mobile magnetic portion magnet is replaced with *a part having a reduced magnet weight. Said part has an overall volume and its weight is less than what it would be if its overall volume were fully occupied by the magnet.*

2.2 It follows that the subject matter of claims 1 and 21 is novel (PCT Article 33(2)).

The problem that the present invention is intended to solve can be considered to be that of:

- *producing a magnetic levitation actuator in which the switching time and/or actuation current is reduced in comparison with prior art actuators (cf. the present statement, page 3, lines 17-21).*

2.3 The solution to this problem, as proposed in claims 1 and 21 of the present application, is considered to involve an inventive step (PCT Article 33(3)), for the following reasons:

The prior art (D2) does not appear to mention the above technical problem (point 2.2) or to propose an enhanced magnetic actuator and a production method therefor. Moreover, unlike in document D1, the magnetic forces of levitation and motion exerted on the mobile magnetic portion are not proportional to its volume but localised in the mobile magnetic portion at the point where it is closest to the stationary magnetic portion. It follows that reducing the magnet weight in the mobile magnetic portion has a positive effect on the switching power. This would not, however, be the case in document D1 where such weight reduction would adversely affect the switching power.

3. DEPENDENT CLAIMS

Claims 2-20 are dependent on claim 1 and, as such, therefore also fulfil the PCT requirements of

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

novelty and inventive step.

Claims 22-28 are dependent on claim 21 and, as such, therefore also fulfil the PCT requirements of novelty and inventive step.

4. INDUSTRIAL APPLICABILITY

The subject matter of the present invention relates to a magnetic levitation actuator, in particular, a microactuator that can be produced using microtechnology techniques. Such actuators have a high potential in the field of switching systems.